L 51495-65

ACCESSION NR: AP5016495

narrowed. In a first approximation, the dependence of the logarithm of the effective viscosity on the composition of binary mixtures of polyethylenes is expressed by a straight line, which provides the possibility for a tentative calculation of the viscosities of mixtures of polyethylenes. In addition, the viscosity curves can aid in plasticizing high-molecular weight, difficultly reprocessed polyethylenes to a given viscosity, using small additions of a low-molecular component.

Orig. art. has: 2 tables, 5 graphs.

ASSOCIATION: none

SUBMITTED: 00 ENCL: 00 SUB CODE: MT

NO REF SOV: 002 OTHER: 011 JPRS

Card 2/2 7nB

L 17201-65 EWT(m)/EPF(c)/EWP(j)/T Pc-4/Pr-4 RM S/0207/64/000/005/0066/0074
ACCESSION NR: AP5002866

20
B

AUTHORS: Vinogradov, G. V. (Moscow); Malkin, A. Ya. (Moscow)

TITLE: Rheological properties of polymers in the flow state

SOURCE: Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki, no. 5, 1964, 66-74

TOPIC TAGS: polymer rheology, material strength, polymer creep/ REV 1 rotation viscosimeter, P 20 polybutylene, OP 30 polypropylene

ABSTRACT: The rheological properties of polymers were investigated in an effort to obtain mathematical models of observed physical phenomena. Tests were performed on the commercial polymers polybutylene P-20, polypropylene OP-30, certain [illegible] Testing equipment included rotation [illegible] viscosimeter. Deforming [illegible]
[illegible]
ature invariant form of presenting [illegible] is defined which is related to strength by the empirical equation
η_0/η

Card 1/4

L 47201-65 ACCESSION NR: AP5002866

$$\eta_0 / \eta = 1 + 6.12 \cdot 10^{-5}(\gamma\eta_0)^{0.355} + 2.35 \cdot 10^{-4}(\gamma\eta_0)^{0.71}$$

where η_0 is a variable defining the strength as a function of molecular weight and temperature. The experimental data which led to the establishment of the empirical formula are given in a logarithmic graph of η/η_0 vs τ/η_0. Dynamic strength characteristics were also fitted to the empirical equations

$$\eta_0 / \eta_d = 1 + 6.12 \cdot 10^{-5}(\omega\eta_0)^{0.355} + 2.35 \cdot 10^{-4}(\omega\eta_0)^{0.71}$$

$$N(\omega) = \eta_0 \left[\sum_{k=1} L_k (\omega\eta_0)^{0.355k} \right] : \left[\sum_{k=0} M_k (\omega\eta_0)^{0.355k} \right]$$

where η_d is the dynamic strength parameter, ω is the dynamic frequency, $N(\omega)$ is the Laplace function, and L_k and M_k are constants obtained from the equation for η_0/η_d. The temperature invariant stress vs time relationship is given in the form

$$\frac{\tau(t/\eta_0)}{\tau_0} = \int_0^{\infty} \frac{N(s)/\eta_0}{s} e^{-(t/\eta_0)s} \, ds$$

$$s = \omega\eta_0$$

Card 2/4

L 27201-65 ACCESSION NR: AP5002866

and experimental data are plotted to demonstrate this relationship. Orig. art. has: 8 equations and 6 figures.

ASSOCIATION: none

SUBMITTED: 17Jun64 ENCL: 01 SUB CODE: MT

NO REF SOV: 009 OTHER: 003

Card 3/4

L 27347-66 EWT(m)/EWP(w)/T/EWP(j)/EWP(t) IJP(c) JD/DJ/GS/RM/JH
ACC NR: AT6008940 (A) SOURCE CODE: UR/0000/65/000/000/0015/0025

AUTHORS: Vinogradov, G. V.; Podol'skiy, Yu. Ya.; Mustafayev, V. A.

ORG: none

TITLE: New aspects in the problems of friction between plastics and metals

SOURCE: Moscow. Institut mashinovedeniya. Plastmassy v podshipnikakh skol'zheniya; issledovaniya, opyt primeneniya (Plastics in friction bearings; research and experiment in application). Moscow, Izd-vo Nauka, 1965, 15-25

TOPIC TAGS: friction gage, friction coefficient, plastic, aluminum, copper, steel, iron, polymer, material testing/ Tr-6 friction gage

ABSTRACT: The effect of metallic oxide and salts on the friction behavior of polymers on metals is investigated. It is contended that in certain circumstances metal oxides and salts can form a film between friction pairs of metal and polymer. This film can seriously alter the frictional characteristics of the pair, particularly in conditions of heavy loading and/or high velocity. Tests were conducted on a Tr-6 friction gage according to a method described earlier by V. A. Mustafayev, G. B. Vinogradov, and Yu. Ya. Podol'skiy (Iznos i treniye plastikov pri

Card 1/3

L 27347-66

ACC NR: AT6008940

4

kontaktirovanii ikh s metallami - sb. Treniye i iznos metallov i plastmass (Treniye i iznos v mashinakh, vyp. 19), Izd-vo Nauka, 1964). Friction contact was made between a metallic ring and a plastic disk. Plastic materials tested included textolite, polypropylene and polytetrafluorethylene. Metallic specimens were prepared from copper, aluminum, Armco steel, tempered steel, and pig iron. Tests were performed with and without lubrication, in air and in vacuum, with varying types of loading. Measurements of the change of friction coefficient were made for these varying conditions. Results are plotted in the form shown in Fig. 1.

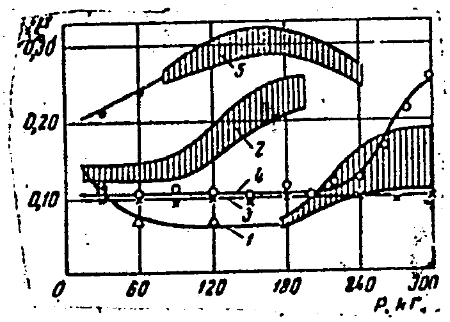

Fig. 1. The effect of loading on the friction of various metals on textolite without lubrication in air. 1 - copper; 2 - aluminum; 3 - Armco steel; 4 - steel; 5 - pig iron.

Card 2/3

L 27347-66
ACC NR: AT6008940

O

It was determined that the most important factor in heavy friction loads of polymers on metals is the change in effective contact area between the rubbing pairs. Orig. art. has: 8 figures.

SUB CODE: 11/ SUBM DATE: 31Jul65/ ORIG REF: 005

Card 3/3 PB

L 27309-66 EWT(m)/EWP(j)/T/ETC(m)-6 IJP(c) WW/RM

ACC NR: AP6008976 SOURCE CODE: UR/0190/65/007/011/1930/1934

36

B

AUTHORS: Malkin, A. Ya.; Vinogradov, G. V.; Kargin, V. A.

ORG: Institute for Petrochemical Synthesis, AN SSSR (Institut neftekhimicheskogo sinteza AN SSSR)

TITLE: Rheology of polymers. The creep of polymers in the molten state

15

SOURCE: Vysokomolekulyarnyye soyedineniya, v. 7, no. 11, 1965, 1930-1934

TOPIC TAGS: polymer rheology, rheologic property, polyethylene, polyisobutylene

ABSTRACT: This investigation was conducted to extend the work of A. Ya. Malkin and G. V. Vinogradov (Kolloidn. zh., 27, 234, 1965). It was desired to determine the temperature invariant lag time distribution spectrum, to calculate theoretically the creep function, and to compare the latter with existing experimental literature data. The calculation is based on the equation presented by B. Gross (Mathematical Structure of the Theories of Viscolasticity, Hermann, Paris, 1953)

$$\gamma(t)=\int_{-\infty}^{t}\frac{d\tau(\theta)}{d\theta}\left[I_0+\frac{t-\theta}{\eta}+\psi(t-\theta)\right]d\theta,$$

where I_0 is the instantaneous yield, ψ - function of reversible creep, η - viscosity in the same region (where it is independent of the nature of the deformation), and τ - the stress. Calculated values of ψ are compared with experimental values obtained

UDC: 678.01:53

Card 1/2

L 27309-66

ACC NR: AP6008976

O

for polyisobutylenes of different molecular weights and for low density polyethylene. The comparison is presented graphically. It is concluded that the experimental data are in good agreement with the calculated results. The relation between elastic and irreversible deformation in the polymer was studied. It is concluded that the boundaries of the two different deformation regions are completely determined by the maximum Newtonian viscosity of the given polymer at the experimental temperature. Orig. art. has: 2 graphs and 7 equations.

SUB CODE: 11/ SUBM DATE: 16Dec64/ ORIG REF: 005/ OTH REF: 004

Card 2/2

L 27899-66 EPF(c)/EWP(j)/EWT(m) RM
ACCESSION NR: AP5024019 UR/0069/65/027/005/0668/0672
532.135

14
13
B

AUTHOR: Vinogradov, G. V.; Belkin, I. M.

TITLE: Rheology of polymers. Elastic and viscous properties of polystyrene in the fluid state

SOURCE: Kolloidnyy zhurnal, v. 27, no. 5, 1965, 668-672

TOPIC TAGS: steady flow, polystyrene, rheologic property, polymer rheology, viscous flow

ABSTRACT: The object of the work was to investigate the elastic and viscous properties and the process of transition from elastic deformations to steady flow in polystyrene melts. Brand D (GOST 9440-60) block polystyrene was studied in the 2×10^{-2} - 2×10 sec^{-1} range of deformation rates at temperatures from 160 to 210° and residual air pressures of about 10^{-2} mm Hg. An REV-1 rotary elasto-viscometer and the technique of steady deformation rates were employed. The rheological properties were found to be similar to those determined earlier in polyethylene melts, (e.g., nature of the dependence of shear stresses on the time and deformation at various constant deformation rates, etc.) In passing from low to high shear rates, the establishment of steady flow is accompanied by a
Card 1/2

L 27699-66
ACCESSION NR: AP5024019

transition through the ultimate strength of the polymer melts. The activation energy of this transition is close to the activation energy of viscous flow. The transition through the ultimate strength involves a breakdown (reversible with time) of the supermolecular structures in the polymer in shear. It is concluded that high-molecular polyolefins and polymers of the vinyl series in the viscofluid state have similar rheological characteristics, and on this basis, general rheological characteristics of polymers in the fluid state are given. Orig. art. has: 5 figures and 1 table.

ASSOCIATION: Institut neftekhimicheskogo sinteza AN SSSR im. A. V. Topchiyeva (Institute of Petrochemical Synthesis, AN SSSR)

SUBMITTED: 08Jun64 ENCL: 00 SUB CODE: MT, GC

NO REF SOV: 002 OTHER: 008

Card 2/2

L 15042-66 EWT(m)/EWP(j)/T/ETC(m)-6 WW/DJ/RM

ACC NR: AP6003945 SOURCE CODE: UR/0374/65/000/005/0095/0100

AUTHOR: Mustafayev, V. A. (Moskva); Podol'skiy, Yu. Ya. (Moskva); Vinogradov, G. V. (Moskva)

ORG: none

55
B

TITLE: Cold flowing and melting of plastics under heavy friction conditions

SOURCE: Mekhanika polimerov, no. 5, 1965, 95-100

TOPIC TAGS: plastic, crystalline polymer, polymide, polytetrafluoroethylene, friction coefficient, melting point

ABSTRACT: A study of friction between crystalline polymers under the load of tens and hundreds of kg/cm^2, carried out with considerable mutual coverage of the friction surfaces and at sliding speeds varied over a range of tens and thousands of times has revealed the effect on their behavior of cold flow and of surface melting. The friction toward the load dependence at low sliding speeds has a pronounced maximum. It is suggested that at constant sliding speed, the area of actual contact between the friction surfaces increases with the increase of loads. This is accompanied by the growth of the friction coefficient. At sufficiently high loads, when the ratio between the area of actual contact and the nominal contact area becomes high, cold flow sets in and is accompanied by an orientation effect. This lowers the friction coefficient. It has been shown by direct experiment that the friction coefficient may

 UDC: 678:531.44

L 15042-66

ACC NR: AP6003945

change from 2 to 3 fold depending on the direction of the friction with respect to the orientation of the single crystals in the surface layers of the polymer sample. At high sliding speeds, an increase in the load increases the heat generated during the friction, which in its turn, softens the surface layers of the polymer. The result is an increase in the area of actual contact and a rise in the friction coefficient. Under heavy friction conditions where surface melting occurs on the samples, the friction remains constant with growing loads. The fact that a surface layer of melt forms is evident from the ease with which the surface layer separates from the sample on rapid cooling. No anisotropic surface structures develop during melting. Therefore, training of crystalline polymers at high pressures and speeds has no substantial effect on their friction. Orig. art. has: 6 figures. [Based on author's abstract].

SUB CODE: 11 SUBM DATE: 25Mar65/ ORIG REF: 008/ OTH REF: 001/

GC

Card 2/2

PAKSHVER, E.A.; IGNATOVA, A.I.; VINOGRADOV, G.V.

Temperature dependence of the viscosity of polymer solutions.
Vysokom. soed. 7 no.11:1964-1967 N '65. (MIRA 19:1)

1. Nauchno-issledovatel'skiy institut sinteticheskikh volokon i Institut neftekhimicheskogo sinteza AN SSSR.

APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001859910018-9"

MALKIN, A.Ya.; VINOGRADOV, G.V.; KARGIN, V.A.

Rheology of polymers. Creep of polymers in a molten state.
Vysokom. soed. 7 no.11:1930-1934 N '65. (MIRA 19:1)

1. Institut neftekhimicheskogo sinteza AN SSSR. Submitted December 16, 1964.

PODOL'SKIY, Yu.Ya. (Moskva); KOREPOVA, I.V. (Moskva); VINOGRADOV, G.V. (Moskva)

Conditions and kinds of seizing caused by the friction of hardened steel in hydrocarbon lubricating media. Mashinovedenie no.5:109-114 '65. (MIRA 18:9)

NOSOV, M.I.; VINOGRADOV, G.V.

Efficiency of polysiloxanes as additives to petroleum lubricants under various friction conditions. Khim. i tekh. topl. i masel 10 no.3:52-54 Mr '65. (MIRA 18:11)

VINOGRADOV, G.V.; BELKIN, I.M.

Rheology of polymers. Elastic strength properties and viscosity of molten polyethylene. Koll. zhur. 27 no.4: 499-504 Jl-Ag '65. (MIRA 18:12)

1. Institut neftekhimicheskogo sinteza AN SSSR, Moskva. Submitted January 27, 1964.

KULEZNEV, V.N.; KONYUKH, I.V.; VINOGRADOV, G.V.; DMITRIYEVA, I.P.

Rheology of binary polymer mixture. Koll. zhur. 27 no.4:540-545 Jl-Ag '65. (MIRA 18:12)

1. Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni M.V. Lomonosova i Institut neftekhimicheskogo sinteza AN SSSR imeni A.V. Topchiyeva. Submitted December 29, 1964.

VINOGRADOV, G.V.; BELKIN, I.M.

Rheology of polymers. Elastic strength and viscous properties of polystyrene in a molten state. Koll. zhur. 27 no.5:668-673 S-O '65. (MIRA 18:10)

1. Institut neftekhimicheskogo sinteza AN SSSR imeni Topchiyeva.

MANIN, V.N. (Moskva); VINOGRADOV, G.V. (Moskva)

Different types of turbulence in highly elastic liquids.
Koll. zhur. 27 no.5:784-785 S-O '65. (MIRA 18:10)

SOURCE: Khimicheskiye volokna, no. 2, 1965, 7-11

TOPIC TAGS: polypropylene, viscous flow, stress relaxation, Maxwell law, polypropylene, elast

ABSTRACT:

L 01504-66
ACCESSION NR: AP

empirical formula is expressed as

$$\eta_{\text{н}}/\eta = 1 + 6.12 \cdot 10^{-3} (\tau \eta_{\text{н}})^{0.355} + 2.35 \cdot 10^{-6} (\tau \eta_{\text{н}})^{0.71}$$

where $\eta_{\text{н}}$ is the maximum Newtonian viscosity, η the effective viscosity, and τ ...

given by the Arrhenius relationship, $\lg \eta_{\text{н}} = A - E/RT$

with an energy of activation E = 23 Kcal/mole. The molecular weight determined from viscosity data was found to be 9 x 10^5. From stress relaxation data it is concluded that polypropylene does not obey Maxwell's law, nor can the relaxation ... linear model. Orig. art. has: ... formulas and ... equations.

ASSOCIATION: Institut neftekhimicheskogo sinteza im. A. V. Topchiyeva, AN SSSR (Institute for Petrochemical Synthesis, AN SSSR)

SUBMITTED: ...

NO REF SOV: 00...   OTHER: 008

Card 2/2

KONYUKH, I.B.; VINOGRADOV, G.V.

Study of high-pressure polyethylene and polyisobutylene on a rotary elastoviscometer. Plast. massy no.2:60-64 '65. (MIRA 18:7)

L 3792-66 EWT(m)/EPF(c)/EWP(j)/T RM

ACCESSION NR: AP5023211 UR/0374/65/000/004/0106/0116
678:534.641

AUTHOR: Yanovskiy, Yu. G. (Moscow); Vinogradov, G. V. (Moscow)

TITLE: Dynamic properties of polymers in state of flow

SOURCE: Mekhanika polimerov, no. 4, 1965, 106-116

TOPIC TAGS: dynamic stress, rheologic property, solid viscosity, solid mechanical property, polymer, polyisobutylene, polyethylene plastic

ABSTRACT: A frequency rheometer (based on a design described by E. R. Fitzgerald and I. D. Ferry, *J. Colloid Sci.*, 1953, 8, 1) is used to study the dynamic properties of polymers. This frequency rheometer operates in 20 - 10^4 cycle/sec frequency range and in -500° to +170°C temperature range and it can handle liquids (viscosity over $5 \cdot 10^2$ poise) as well as typical solids with a shear modulus of up to 10^{10} dynes/cm^2. Comparison of measurements of dynamic viscosity and apparent viscosity of polymers in state of flow indicates reliability of the dynamic measurements made on this frequency rheometer. For polyisobutylene, high- and low-density polyethylene, and polystyrene were determined: the dependence of modulus of elasticity upon acoustical frequency and of tangent of mechanical friction upon

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L 3792-66

ACCESSION NR: AP5023211

reduced acoustical frequency. The elastic shear modulus for polymers in state of flow is of the order of 10^6-10^7 dynes/cm^2. For polymers in state of flow, the coincidence of dynamic viscosity with the apparent viscosity measured under static conditions is about ±50%. It is concluded that spectra of relaxation time of polymers in both solid and liquid state can be readily determined on the basis of dynamic properties measured on the frequency rheometer. Orig. art. has: 10 figures.

ASSOCIATION: none

SUBMITTED: 15Apr65 ENCL: 00 SUB CODE: MT, OC

NO REF SOV: 012 OTHER: 008

PC

Card 2/2

MALKIN, A.Ya.; VINOGRADOV, G.V.

Dependence of the viscosity on the moleculzr weight, temperature, and parameters determining strain in polymers in the state of viscous flow. Vysokom.soed. 7 no.7:1134-1139 Jl '65. (MIRA 18:8)

1. Institut neftekhimicheskogo sinteza AN SSSR.

MALKIN, A.Ya.; YANOVSKIY, Yu.G.; VINOGRADOV, G.V.

Universality of the temperature-invariant characteristics of the dynamic properties of linear polymers in the state of flow. Vysokom. soed. 7 no.7:1140-1146 Jl '65. (MIRA 18:8)

1. Institut neftekhimicheskogo sinteza AN SSSR.

MALKIN, A.Ya.; VINOGRADOV, G.V.

Rheology of polymers. Relaxation properties of polymers in a state of visco-plastic flow. Koll. zhur. 27 no.2:234-241 Mr-Ap '65. (MIRA 18:6)

1. Institut neftekhimicheskogo sinteza AN SSSR, Moskva.

DEYNEGA, Yu.F. (Moskva); SINITSYN, V.V. (Moskva); VINOGRADOV, G.V. (Moskva)

Optical anisotropy of calcium greases. Koll. zhur. 27 no.2:289 Mr-Ap '65.
(MIRA 18:6)

L 63837-65

ACCESSION NR: AP5020222

UR/0069/65/027/004/0499/0504
541:025:532.135

AUTHORS: Vinogradov, G. V.; Belkin, I. M.

TITLE: Rheology of polymers. The elastic strength and viscosity properties of polyethylene in the fluid state

SOURCE: Kolloidnyy zhurnal, v. 27, no. 4, 1965, 499-504

TOPIC TAGS: viscosity, viscous flow, polyethylene, polymer, elastomer, elastic stress / alkatene ... polymer, ... polyethylene

ABSTRACT: Rheological properties of a representative polymer exhibiting visco-elastic properties in the fluid state were investigated. ... experiments were carried out at ... elastoviscometer ... Vinogradov et al. (Zavodsk. laboratoriya ..., 1965, ...). The polymers investigated were alkatene-2 and polyethylene ... The dependence of the shearing stress ... strength and the shearing stress in the state of steady flow were determined. It was found that an increase in the rate of deformation causes a decrease in the time required to reach the yield point. The activation energy for steady flow and an ultimate shear strength transition are of similar magnitude. The moduli for

Card 1/2

L 63837-65
ACCESSION NR: AP5020222

3

high elastic shear deformation of molten polymers with unimpaired structure increase with increase in the rate of deformation. It is concluded that the polyethylene melts represent thixotropic liquids of high elasticity. Orig. art. has: 5 graphs.

ASSOCIATION: Institut neftekhimicheskogo sinteza AN SSSR, Moscow (Institute for Petrochemical Synthesis, AN SSSR) 44,55

SUBMITTED: 27Jan64 ENCL: 00 SUB CODE: OC, GC

NO REF SOV: 006 OTHER: 011

L 63829-65 EWT(m)/EPF(c)/EWP(j)/T RM

ACCESSION NR: AP5020225

UR/0069/65/027/004/0540/0545
541.18:532.5

AUTHORS: Kuleznev, V. N.; [44,55] Konyukh, I. V.; [44,55] Vinogradov, G. V.; [44,55] Dmitriyeva, I. P. [44,55]

TITLE: Rheology of binary polymer mixtures

SOURCE: Kolloidnyy zhurnal, v. 27, no. 4, 1965, 540-545

45
39
B

TOPIC TAGS: viscosity, viscous flow, polyethylene, polypropylene, polymer [44,55]

ABSTRACT: The work was undertaken to extend the data of V. N. Kuleznev, A. G. Shvarts, V. D. Klykova, and B. A. Dogadkin, (Koloidn. zh. 27, 211, 1965) on the behavior of binary polymeric mixtures. The stress-strain behavior of isotactic polypropylene (I) with low (II) and medium (III) pressure polyethylene was investigated. The experiments were carried out at 190C in the presence of [illegible] 1,1'-thio-bis-(2 methyl-4-oxy-5-tert-butylbenzene) stabilizer. The experimental results are summarized in Fig. 1 and Fig. 2 of the Enclosure. An equation for the viscosity of binary polymeric mixtures is

$$\eta_{mix} = (\omega_1\eta_1^{1/a} + \omega_2\eta_2^{1/a})^a,$$

where ω and η are the weight fraction and viscosity of the pure component

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L 63829-65

ACCESSION NR: AP5020225

6

respectively, and α is a constant equal to 4.2 for I, II, and III. For the region of mutual polymer solubility, a reinforcement of the polyethylene melt by small amounts of polypropylene has been observed. It is concluded that the polymer mixtures are described by the universal temperature invariant viscosity parameter of the individual linear polymers. Orig. art. has: 3 graphs and 1 equation.

44,55

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii im. M. V. Lomonosova (Moscow Institute for Fine Chemical Technology) Institut [illegible]

Card 2/4

L 63829-65

ACCESSION NR: AP5020225

ENCLOSURE: 01

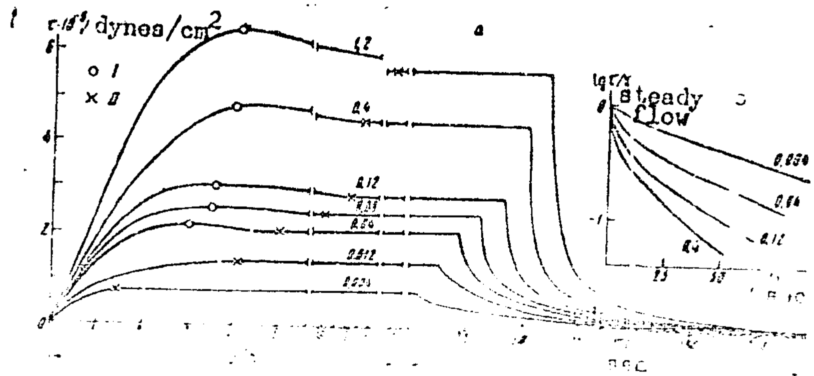

Fig. 1.

Typical dependence of shear stress τ on the deformation γ (a) and stress relaxation in stress-time coordinates (a), and log $\tau/\tau_{\text{steady fl.}}$ - time (b). Mixture of I:III 50:50, numbers on curves - velocity of deformation $\dot{\gamma}$, sec^{-1}. I- curve maxima, II- beginning of steady flow

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L 63829-65

ACCESSION NR: AP5020225 ENCLOSURE: 02

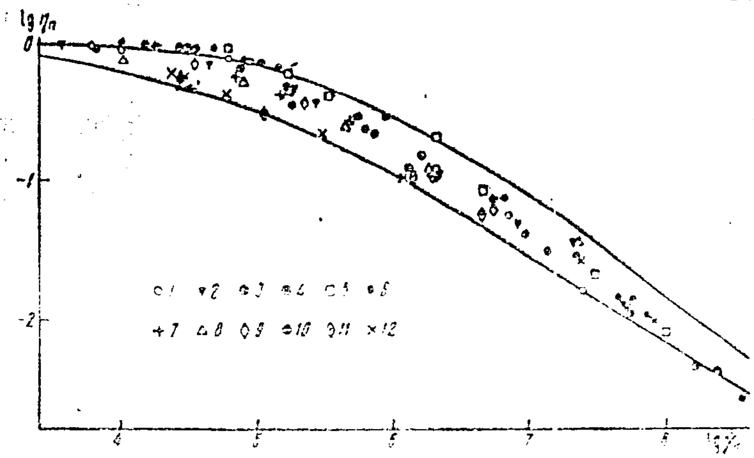

Fig. 2.

Universal temperature invariant viscosity parameter of polymeric mixtures. Mixtures III:I - 0:100 (1), 10:90 (2), 50:50 (3), 70:30 (4), 90:10 (5), 100:0 (6). Mixtures II:I - 10:90 (7), 50:50 (8), 85:15 (9), [illegible], [illegible], [illegible]

Card 4/4

KONSTANTINOV, A.A.; SINITSYN, V.V.; VINOGRADOV, G.V.

Automatic capillary viscosimeter AKV-4. Zav. lab. 31 no.2:239-241 '65. (MIRA 18:7)

L 63764-65 EWT(m)/EPF(c)/EWP(j)/T/EWP(k) RM

ACCESSION NR: AP5018087 UR/0020/65/163/001/0140/0143

AUTHOR: Vinogradov, G. V.; Yanovskiy, Yu. G.; Bublik, L. S.

TITLE: Dynamic characteristics of polymers in viscous-flow state in the sonic frequency region

SOURCE: AN SSSR. Doklady, v. 163, no. 1, 1965, 140-143

TOPIC TAGS: viscous flow dynamics, polymer flow, sonic frequency region, frequency rheometer, shear rate, shear modulus, effective viscosity, dynamic viscosity

ABSTRACT: By contrast with the large volume of data accumulated concerning the dynamic properties of polymers in glassy and highly elastic states, very little is known about polymers in a state of flowage. To fill this gap, the authors investigated the dynamic properties of the following polymers: P-20 polyisobutylene, high-pressure polyethylene, low-pressure polyethylene and block polystyrene, in the frequency range of from $2 \cdot 10^2$ to $2.2 \cdot 10^3$ cps and in a broad range of temperatures. Such a choice of specimens made it possible to investigate both highly crystalline and amorphous polymers. The dynamic properties were measured in a frequency rheometer operating in the temperature range of from -50 to +170°C in

Card 1/3

L 63764-65

ACCESSION NR: AP5018087

the sonic frequency region and making it possible to measure the compound shear modulus $G^* = G' + G''$, where G' is the real part of the compound shear modulus, characterizing the elastic properties of the material, and G'' is the imaginary part, characterizing the losses. At the same time, the dynamic viscosity $\eta_\omega = G''/\omega$, where ω is the frequency, and the mechanical-loss tangent $\tan \delta = G''/G'$ also could be determined. The reliability of the rheometric measurements of [illegible] characteristics was verified by comparing the measured η_ω with the effective viscosity η_e of polymers, which is [illegible] technique of viscosimetry. The positive results of this comparison indicate [illegible] the dependence of effective viscosity on the shear rate (in isothermally steady-state flows), in the presence of high values of this rate, can be determined both by direct measurements of dynamic viscosity and by the general dynamic-static response curve of the viscous properties of polymer systems -- a curve of both η_ω and η_e (as functions of shear rate $\dot{\gamma}$ and frequency ω, respectively. This is highly important considering that the intense heat release in highly viscous media in the presence of high shear rates complicates and sometimes renders impossible the measurement of viscosity in steady-state flows. During the melting of such polymers as the polyethylenes G' decreases at a much faster rate than G'', which conditions a sharp increase in the mechanical-loss tangent in this region. Orig. art. has:

Card 2/3

ACCESSION NR: AP5018087

4 figures.

ASSOCIATION: Institut neftekhmicheskogo sinteza im. A. V. Topchiyeva Akademii nauk SSSR (Topchiyev Institute of Petrochemical Synthesis, Academy of Sciences SSSR)

SUBMITTED: 26Dec64 ENCL: 00 SUB CODE: MT, ME

NO REF SOV: 006 OTHER: 006

Card 3/3

L 1432-66 EWT(m)/EPF(c)/EWP(j)/T RM

ACCESSION NR: AP5021891 UR/0020/65/163/006/1419/1422

58
B

AUTHORS: Vinogradov, G. V.; Mustafayev, V. A.; Podol'skiy, Yu. Ye.; Malinskiy, Yu. M.

TITLE: Transition of external friction to viscous flow during surface melting of polymers

SOURCE: AN SSSR. Doklady, v. 163, no. 6, 1965, 1419-1422

TOPIC TAGS: polymer, friction, viscosity, viscous flow, polystyrene, polyethylene, resin

ABSTRACT: A tribometer was designed by means of which the effect of temperature on the surface friction of polymers was studied. A schematic of the tribometer is shown in Fig. 1 on the Enclosure. Three different types of polymers involved in this study were: amorphous, crystalline, and radiationally cross-linked polyethylene. The experimental results are shown graphically; typical results for amorphous polymer are given in Fig. 2 on the Enclosure. The form of the experimental curves is explained in terms of a relaxation mechanism. Orig. art. has: 4 graphs.

ASSOCIATION: Institut neftekhimicheskogo sinteza, Akademii nauk SSSR (Institute

Card 1/4

L 1432-66

ACCESSION NR: AP5021891

6

for Petrochemical Synthesis, Academy of Sciences SSSR) 44,55; Fiziko-khimicheskiy institut im. L. Ya. Karpova (Physico-Chemical Institute) 44,55

SUBMITTED: 04Feb65 ENCL: 02 SUB CODE: OC

NO REF SOV: 009 OTHER: 002

Card 2/4

L 1432-66
ACCESSION NR: AP5021891

ENCLOSURE: 01

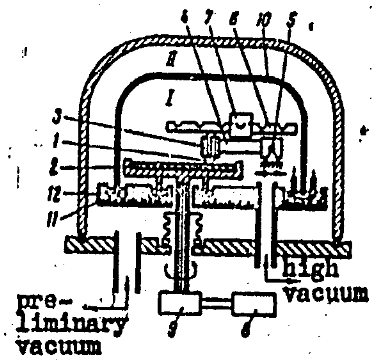

Fig. 1.

Principal schematic of the tribometer Tr-7.
1- semispherical slider; 2- disk; 3- chuck; 4- dynamometric plate; 5- hinged support; 6- lever; 7- load; 8- electric motor; 9- reducer; 10- glass cover; 11- sealing liquid; 12- plate

Card 3/4

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ACCESSION NR: AP5021891

ENCLOSURE: 02

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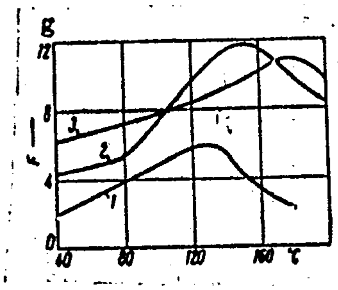

Fig. 2.

Effect of temperature on friction between steel and amorphous polymers (load 10 g, rate of sliding 5×10^{-3} cm/sec).
1- polyvinylacetate; 2- polystyrene; 3- polymethylmethacrylate

Card 4/4 DP

MUSTAFAYEV, V.A.; VIN[illegible], G.V.; [illegible]SKIY, Yu.Ya.

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Antifrictional properties of steel in the presence of polymer powders. Ibid.:127-137 (MIRA 18:3)

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APPROVED FOR RELEASE: 09/01/2001 CIA-RDP86-00513R001859910018-9"

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Distortions of space perception due to certain specific features of the binocular visual apparatus. Probl.fiziol.opt. 12:266-274 '58 (MIRA 11:6)

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Fundamental operational prmises in the design of bulk load ferighters
Mor.flot 16 no.11:6-9 N '56. (MIRA 10:1)
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Instruments for measuring the resilence of springs and pistons. MTS 12 No. 4, 1952

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1. VINOGRADOV, I.

2. USSR (600)

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Flapping flight. Kryl.rod. 10 no.3:26 Mr '59. (MIRA 12:4)

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Using hydraulic methods in unlaoding coal from river crafts and transporting it to its destination. Rech. transp. 19 no.4:15-16 Ap '60. (MIRA 14:3)

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Organization and guidance of health education. Voen.-med. zhur. no.5:36-38 My '60. (MIRA 13:7)

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Basic trends in the improvement of the fabric formation process.
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(MILITARY MEDICINE)

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1. Gosudarstvennyy planovoy komitet Soveta Ministrov SSSR (for Martynkin). 2. Opytnyy zavod Vsesoyuznogo nauchno-issledovatel'skogo instituta tekstil'nogo mashinostroyeniya (VNIILTEkmash) (for Vinogradov).

(Weaving)

VINOGRADOV, A. P.

PA 239T31

USSR/Chemistry - Lead Isotopes Aug 52

"Isotopic Composition of Lead and the Age of the Earth," A. P. Vinogradov, Corr Mem Acad Sci USSR; I. K. Zadorozhnyy and S. I. Zykov, Inst of Geochem and Analyt Chem imeni V. I. Vernadskiy, Acad Sci USSR

"DAN SSSR" Vol 85, No 5, pp 1107-1110

Thirty-two samples of galena were studied with a mass spectrograph for the compn with respect to Pb^{204}, Pb^{206}, Pb^{207}, and Pb^{208}. On the basis of this and other data, the age of the earth is estimated to be between $2.1.10^9$ and $(5.0 \pm 0.5).10^9$ years.

239T31

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Source: ...

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SO: -I
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VINOGRADOV, Ivan Matveevich, 1891-

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Vinogradov, I. M. The upper bound of the modulus of a trigonometric sum. Izvestiya Akad. Nauk SSSR ... Mat. 14, 199-214 (1950). (Russian)

The author gives a detailed ... following theorem ... [illegible]

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[illegible] application to questions of uniform distribution [illegible] Theorems 2 and 4 [illegible]

[illegible] with the O-estimate [illegible] 49 of [illegible] book [illegible] previous paper of the author [Izvestiya Akad. Nauk [illegible]

VINOGRADOV, I. M.

USSR/Mathematics - Prime Number Theory — Jul/Aug 51

"An Arithmetic Method Applied to Problems on the Distribution of Numbers With Given Property of the Index," I. M. Vinogradov, Math Inst imeni Steklov, Acad Sci USSR

"Iz Ak Nauk SSSR, Ser Matemat" Vol XV, No 4, pp 297-308

Gives new elementary derivation of number of laws on the distribution of numbers with assigned property of the index relative to a prime modulus. Aims to show that combination of author's method

187T37

USSR/Mathematics - Prime Number Theory (Contd) — Jul/Aug 51

of binary sums (1934-37) and a special method of exhaustion of the region of summation can serve as source of purely arithmetical approach to the soln of various problems of theory of numbers. Submitted 2 Apr 51.

187T37

VINOGRADOV, I. M.

PHASE I TREASURE ISLAND BIBLIOGRAPHICAL REPORT AID 635 - I

Call No.: AF467703

BOOK
Author: VINOGRADOV, I. M., Academician
Full Title: FUNDAMENTALS OF THE THEORY OF NUMBERS. 6ed., corrected
Transliterated Title: Osnovy teorii chisel. Izd. 6-e ispravl.

PUBLISHING DATA
Originating Agency: None
Publishing House: State Publishing House of Technical and Theoretical Literature
Date: 1952 No. pp.: 180 No. of copies: 10,000
Editorial Staff: None

PURPOSE: Textbook in Physico-Mathematical Departments of State Universities, approved by the Ministry of Higher Education of the U.S.S.R.

TEXT DATA
Coverage: In the preface to the fifth edition, the author mentions the names of Russian mathematicians who studied the theory of numbers and refers the reader to B. N. Delone's book Petersburg School of the Theory of Numbers. He states that he gives a systematic presentation of this theory within the scope of a university course, and explains the substantial changes made on the previous edition. The six chapters, subdivided into several sections, cover the sub-

Osnovy teorii chisel. Izd. 6-e ispravl.

AID 635 - I

ject as follows: Chapter I, theory of divisibility; ch. II, principal functions in the theory of numbers; ch. III, congruences; ch. IV, linear congruences with one unknown quantity; ch. V, quadratic congruences; ch. VI, primitive roots and indices. Every chapter has a number of questions and numerical examples, the answers and solutions of which are given in the end of the book. Two tables, a table of indices and a table of prime numbers, conclude the text.
No. of References: None given
Facilities: None

~~VINOGRADOV, I. M.~~

PHASE I TREASURE ISLAND BIBLIOGRAPHIC REPORT AID 142 - I

BOOK Call No.: AF558003

Author: VINOGRADOV, I. M.
Full Title: ACADEMICIAN I. M. VINOGRADOV. SELECTED WORKS
Transliterated Title: Akademik I. M. Vinogradov. Izbrannyye trudy

Publishing Data
Originating Agency: Academy of Sciences, U.S.S.R.
Publishing House: Publishing House of the Academy of Sciences, U.S.S.R.
Date: 1952 No. pp.: 436 No. of copies: 3,000

Editorial Staff
Editor: Linnik, Yu. V., Dr. of Phys. - Math, Sciences Tech. Ed.: None
Editor-in-Chief: None Appraiser: None

Text Data
Coverage: The book reprints 26 original works of Vinogradov from 1917 to 1951 out of a list of 116 given in the end of the text. The topics covered include a new method of obtaining asymptotic expressions for arithmetical functions, a general theorem of the analytical theory of numbers, the method of trigonometical sums in the theory of numbers, and others. The material is pure higher mathematics with little reference to practical use.

Purpose: Not given

~~VINOGRADOV, I.M.~~

Akademik I. M. Vinogradov. Izbrannyye trudy AID 142 - I

Facilities: None
No. of Russian and Slavic References: Several in footnotes and in bibliographical notes at the end of some articles.
Available: A.I.D., Library of Congress.

2/2

USSR/Mathematics - Theory of Numbers, Summation May/Jun 52

"New Approach to Evaluating the Sum of the Values χ (p + k)," I. M. Vinogradov

"Iz Ak Nauk, Ser Matemat" Vol XVI, No 3, pp 197-210

Derives a new evaluation of the sum of values modulo prime q, different from the principal, under the condition that the argument runs over numbers of the type p + k, where k is a const and p a prime, not over N. The evaluation is nontrivial for

217T64

$N > q^{0.75+\varepsilon}$. Appendices deal with distribution of deductions and nondeductions of deg n modulo q of numbers of the type p + k. Received 10 Jan 52.

217T64

VINOGRADOV, I. M.

VINOGRADOV, I. M.

PA 249T95

USSR/Mathematics - Developments Nov 52

"New Progress in Soviet Science: I. Mathematics in the USSR," Acad I. M. Vinogradov

Priroda, Vol 41, No 11, pp 62-63

Describes progress in mathematics in Russia starting with Lobachevskiy up to present day. Now collectives on mathematics are to be found not only in Moscow, Leningrad, and Kiev, but also in Tbilisi, Yerevan, Lvov, Tashkent, etc. Particular progress has been achieved in theory of numbers, algebra, mathematical logic, geometry, theory of probability, theory of functions, differential equations, and approximate solutions.

249T95

* Vinogradov, I. M. Osnovy teorii čisel. (Foundations of the theory of numbers

VINOGRADOV, I.M.

Vinogradov, I. M. An elementary proof of a theorem from the theory of prime numbers. Izvestiya Akad. Nauk SSSR. Ser. Mat. 17, 3-12 (1953). (Russian)

[illegible] [illegible] p q [illegible] p q [illegible] then $\pi_1(N, q) = \sigma\pi(N) + O(R)$ where

$$R = N^{1+\epsilon}[(1/q + q/N)^{1/2} + N^{-1/6}]$$

so that for large q and N/q, $\pi_1(N, q)$ is asymptotically $\sigma\pi(N)$. The author remarks that a modification of the method enables him to replace the exponent $-1/6$ of N by $-1/5$ and that the method is applicable to a number of other problems including the corresponding question for primes in a given arithmetic progression.

The method of proof is different from that in Chapter XI of the author's book [Trudy Mat. Inst. Steklov. 23 (1947); these Rev. 10, 599] which depended on the estimation of exponential sums; the final result in the book corresponds (over)

VINOGRADOV, I. M. 2/2

to the estimate with $-1/6$ replaced by $-1/5$ and has a few other refinements as well. The present proof depends on the use of the function $\psi_\sigma(x)$ defined to be $1-\sigma$ if $x-[x]<\sigma$ and to be $-\sigma$ otherwise. By applying devices similar to those the author previously used for giving elementary estimates for sums of the form $\sum_x(f(x)-[f(x)])$, he now gives upper bounds for the absolute values of sums of the form

$$\sum_x \psi_\sigma(\alpha x+\beta),\quad \sum_x\sum_y \psi_\sigma(xy/q+h/q),\quad \sum_x\sum_y \psi_\sigma(axy/q),$$
$$\sum_x\sum_y\sum_m \psi_\sigma(axym/q),\quad \sum_p \psi_\sigma(ap/q).$$

From the estimate of the last sum, the result immediately follows. The methods used here are technically simpler than those used in the author's book. *L. Schoenfeld.*

VINOGRADOV, I.M.

Vinogradov, I. M. Improvement of an estimate for the sum of the values $\chi(p+k)$. Izvestiya Akad. Nauk SSSR. Ser. Mat. 17, 285–290 (1953). (Russian)

The author improves his previous estimate [same Izvestiya 16, 197–210 (1952); these Rev. 14, 22] for the sum $\sum_{p \leq N} \chi(p+k)$ where χ is a nonprincipal character modulo q and p is prime. If $cq^{3/4} \leq N \leq c'q^{3/4}$, then the sum has an estimate of the form

$$N^{1+\epsilon}(q^{1/4}N^{-1/3}+N^{-1/10})$$

in place of the earlier inferior estimate of $N^{1+\epsilon}q^{3/16}N^{-1/4}$. The method now used is very similar to that used in the earlier paper and still depends on Weil's estimate of the Kloosterman sum. However, a more elaborate argument enables the author to obtain the sharper estimate. *L. Schoenfeld*

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